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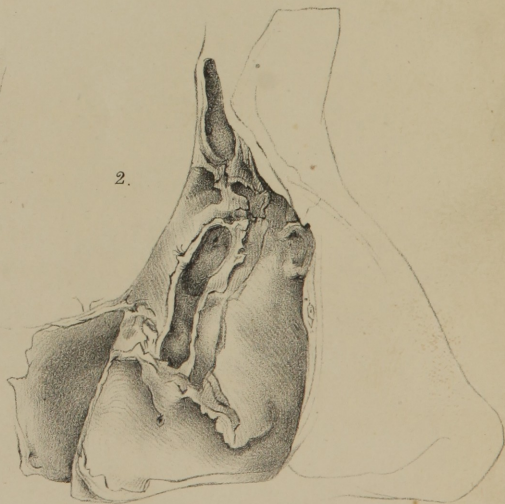
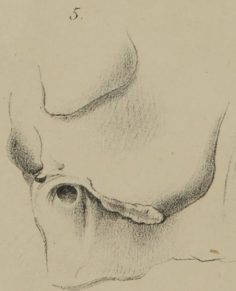
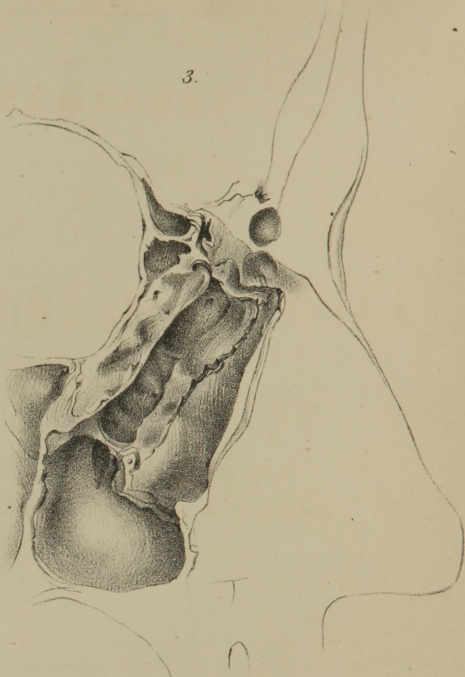
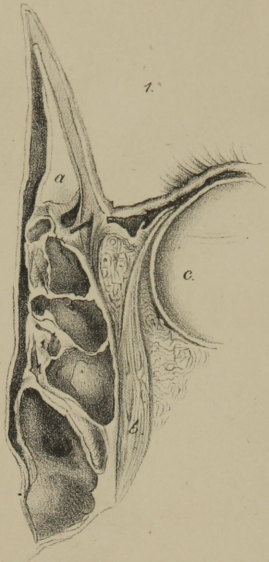
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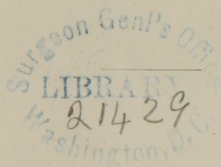


TREATMENT  
OF  
LACHRYMAL AFFECTIONS.

BY  
Ferdinand ✓  
PROFESSOR ARLT,  
PROFESSOR OF OPHTHALMOLOGY AT THE UNIVERSITY OF VIENNA.

TRANSLATED, WITH PERMISSION OF THE AUTHOR, FROM THE  
THIRD PART, FOURTEENTH VOLUME, OF THE GRAEF-  
ISCHEN ARCHIVE FUR OPHTHALMOLOGIE,

BY  
JOHN F. WEIGHTMAN, M.D.



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## P R E F A C E.

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IN presenting this pamphlet to the notice of the medical profession, the translator offers no excuse further than the importance of the subject. The author has spent many years in studying this subject, and has only recently given the results of his observations to the public. By following the rules laid down by him, the lachrymal probe may nearly always be introduced with ease and safety, where previously the introduction was attended with much difficulty. The numbers, 5, 6, etc., refer to the different sizes of Bowman's probes. The term "lachrymal passages" has been used in a collective sense, to indicate the lachrymal sac and nasal duct, as the original word,

“*thränenschlauches*,” has no English synonym, and is used collectively by German ophthalmologists.

TRANSLATOR.

VIENNA, March 1st, 1869.

## TREATMENT OF LACHRYMAL AFFECTIONS.

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IN conversing with various colleagues, at the last Ophthalmological Congress, held in Paris, I was convinced that the views held in relation to treating lachrymal affections were very much at variance, and there still remained much to be explained. I hope to make the subject more easily understood by adding plates of three anatomical preparations, as every one is not so situated as easily to obtain them, and these show those mechanical relations to which it is necessary to pay attention when the probe is introduced.

Fig. 1 represents the lower portion of a horizontal section of a head, previously frozen hard and cut by means of a fine saw at the height of the internal palpebral ligament, through the eyeball and lachrymal sac. A

bristle has been passed through the inferior canaliculus, so that it is more dilated than in nature. The section has cut the inferior canaliculus in its ascent towards the roof of the sac, which has here been removed, about one and a half lines in front of the internal opening, so that the bristle appears free, and pushed further posterior than the point of opening is usually found. The sac presents a nearly triangular or half elliptical opening, with an antero-posterior diameter of about two lines, and lateral diameter of three quarters of a line. The outer wall is straight, while the inner corresponds to the concavity of the bone.

It will be observed, in order to enter the sac by means of the inferior canal, that the point of the probe must not only always be held on the anterior inferior wall of the canaliculus, but the punctum be drawn down and to the outside; in other words, be stretched toward the point of exit of the subcutaneous maxillary nerve, because however slight the arching of the eyeball, especially in myopia or exophthalmia, it so resists or impedes the introduction of the instrument that it is only possible to introduce the probe toward the roof of the sac without injuring the tender

structure of the canaliculus, by stretching or arranging the canal in the manner just mentioned. The introduction of the probe is facilitated by the eye rolling naturally upward, but this may be counteracted by the patient closing the lids tightly. The canaliculus must be kept stretched while the probe is being pushed in the proper direction, toward the roof of the sac, until it is evident that the instrument rests on the lachrymal bone. Only at this time is it proper to elevate the probe from a nearly horizontal to a nearly perpendicular position. Should the instrument be elevated sooner, the point may remain fixed in the canal or in the folds at its opening, and cannot be passed further, lest the wall of the canaliculus be perforated, and the danger be imminent of pushing the probe down outside the wall of the sac. When the instrument is passed toward the roof of the sac, if the lachrymal bone is not suddenly felt, and the skin forms folds when the probe be alternately moved backward and forward, there is reason to believe that the point still remains in the canal, provided the tension of the canaliculus was relaxed previously to the elevation of the instrument, and the probe be not too large for

the diameter of the canal. Likewise in beginning the third movement, passing the probe into the nasal duct, the skin in front of the lachrymal sac must not be pushed in the least inward or posteriorly.

It will be further seen from the drawing that only half of the canaliculus is slit, and only half can be changed into a channel which will remain open, as the inner half of the canal is situated so far from the conjunctival sac that the probability of its remaining open is not even to be expected, though the canaliculus be slit along its whole length. This circumstance has an essential influence on the third movement of probing, elevation. To effect this, the tension of the canal must first be relieved, as it would prevent the second movement of the instrument. The patient is told to look upward, because a closure of the lids at the moment of elevation might cause the probe, which now rests on the internal wall of the lachrymal sac, to be pushed from this point and forced into a false position. The opposite end of the instrument, or the plate on Bowman's probe, describes an arc of about ninety degrees during this movement. When the elevation has been completed, the probe does not stand quite

parallel to the vertical median plane of the face, and while the instrument is being tilted, it passes the eyeball more or less closely, and turns its convexity posteriorly. At the completion of this movement, elevation, the point of the probe rests on the internal wall of the sac, with the convexity on the supraorbital process in front of the notch or somewhat to the outside of it. The instrument does not yet stand in the line of the duct, caused by the resistance which the intact portion of the canal exerts on the probe.

This resistance, this tendency of the probe to be pushed outward, must be overcome by the hand holding the instrument in the third movement of introducing the sound into the nasal duct, without allowing the instrument to slip from the inner wall of the lachrymal sac, and also without pressing it on or into the same. The probe is now held between the thumb, index, and middle fingers; and, when it is wished to pass through the opening of the sac into the maxillary portion of the nasal duct, in other words, in the line of the natural passage, the hand guiding the instrument must endeavor to prevent the declination of the probe inferiorly and posteriorly, to which

points the remaining portion of the canal pushes it. Where the position of the lachrymal sac is relatively deep to the supra-orbital process, the probe must be laid close on the latter, and the eyebrows raised with the other hand, especially where the patient frowns. In general, slightly curved probes are introduced with more ease than those having greater curvatures; but where the supra-orbital process is very prominent, it is necessary to bend the instrument more. Bowman's probes are curved toward the plate. The position which the plate must now be given depends on the lateral obliquity of the lachrymal sac. This is determined by dropping a line from the middle of the tarsal ligaments to the side of the ala of the nose. Where the nose is narrow below, and the lateral obliquity of the sac therefore little or nothing, the plate must look directly forward, and the convexity posterior; but where, on the contrary, and this is the rule, the nose is broader below and the lateral obliquity considerable, the plate must look diagonally outward (in front and to the outside), the convexity diagonally inward (posteriorly and to the inside). With this position of the instru-



ment, the point goes all the more to the outside the greater the curvature. In other words, it must be endeavored, from the formation of the face, to ascertain as nearly as possible the position of the nasal opening of the duct, and the probe pushed toward this point so soon as it has entered the maxillary portion of the nasal duct. By continuing in this direction, the probe is passed carefully forward, and, on meeting with a tough resistance, drawn back, and sometimes slightly rotated, the point being turned more or less to the outside, then again pressed forward without in the least forcing it. I never trouble patients more than five minutes at a time, and never introduce the probe twice in the same day. Where great tenderness exists, I omit the treatment for a day or two. I have sometimes only succeeded in effecting a passage at the expiration of the eighth or tenth day. In some cases Nos. 3 and 4 passed where it was impossible to effect the same with No. 2; and in the last few years I have almost never used No. 1, as it appeared to me that the touch was more uncertain and the danger of a false passage greater.

It appears that in many cases a diminution

in the swelling of the mucous membrane takes place within a few days after the canaliculus has been slit, and the lachrymal sac frequently evacuated by pressure. I have then, sometimes, passed contractions in the region of the inferior turbinated bone quite easily.

In order to be convinced of the presence of the probe at the bottom of the nasal duct, it is not necessary to enter the nose with a hook-shaped instrument, but it may be decided from the relative height of the plate of the probe on the supra-orbital process. To determine this, I lay the end of the probe, at the time the lateral obliquity of the sac is found, on the ala of the nose, so far down that it rests at the same height as the border, and then note the relative position which the plate occupies on the supra-orbital process. If the plate stand at the same height after the introduction of the instrument, then I am sure the point has reached the nasal opening. With long noses the plate takes a deeper position than with short ones. It is not difficult to prove the correctness of these assertions in regard to the direction and length of the lachrymal passages.

I have arrived at the conclusion, from this

method of probing, that not only laying the bone bare is of very rare occurrence, as I stated some ten years since, but also that *complete impassability from adhesion is the exception*. Those cases in which improper methods of probing have been made use of, I do not include in this assertion; likewise, cases in which syphilis and lupus have caused cicatrization of the nasal opening of the duct. I confidently believe that other observers will arrive at the same result, as this has already appeared with regard to the so-called carious lachrymal fistule, and that adhesions will be found to exist scarcely more frequently than caries.

With respect to the course and cavity of the lachrymal passage, I have had two of many dozen preparations which are in my possession, drawn by Dr. Heitzmann to give a clear idea of the relations. In both the posterior inner wall has been removed. The orbital portion, as it was very appropriately named by Prof. von Hasner, is easily recognized as the lachrymal sac. The preparations show distinctly the isthmus at the border between the sac and nasal duct or maxillary portion, which has been denied by many observers, or

considered as a somewhat inconstant sinus or recess of the sac. At its lower border a ledge of bone has been left, which forms the base for the attachment of the inferior turbinated bone. Below this ledge the nasal portion appears, in Fig. 3, as a triangular gutter; in Fig. 2, as a pocket or valve, about three lines below the ridge for the attachment of the inferior turbinated bone. In Fig. 2 the lachrymal sac presents the general opening, but in Fig. 3 an unusually large one. With every figure a smaller one has been added, in order to bring distinctly to view the relations of space in the nasal portion. Figs. 4 and 2, belonging together, show the opening of the sinuous widened lower portion of the maxillary part into the nasal portion, with a view from above. Figs. 5 and 3, belonging together, show the same opening, but much larger, with a view from below. In neither of the subjects from which these preparations were taken, was the slightest trace of a diseased condition found, except in the conjunctival sac.

The points at which I have found cicatricial tissue in probing, have been the opening into the maxillary portion and the region of the inferior turbinated bone. That cica-

trices existed, I concluded from the probe encountering or sliding over cartilaginous-like, resisting ledges or cords; but I have, as yet, had no opportunity of examining such contractions in the dead body.

If we disregard, then, the obstructions which prevent the flow of tears into the lachrymal sac, insufficiency of the palpebral muscle, or changes in the position of the puncta, we must next state that cases of lachrymation occur where tears are conducted into the lachrymal sac, but not into the nose from it, notwithstanding a moderate pressure with the finger suffices to force the contents, which are often very thick, into the nasal passage. The anterior wall of the sac is not, necessarily, therewith much distended, although it generally is the case. The observation is likewise made in many cases of chronic lachrymal blennorrhœa, that, notwithstanding the possibility of introducing thick probes, 5 and 6, through the cut canal into the nose, yet the conduction of the tears does not take place. The patients are no better than before treatment. This fact is inexplicable to me, if it is accepted that for the tears to flow into the nose it is only necessary for them to enter the sac; however, I

comprehend the process when it is presumed—corresponding to my theory of the conduction of the tears—that the orbicularis muscle and the portions arising from the tarsal ligaments cause a momentary compression of the lachrymal sac (which is otherwise protected on all sides by bone) with every movement of the lids. In the condition under consideration, the sac is quite frequently, perhaps always, distended, not only anteriorly, but laterally; indeed with displacement of the bone posteriorly and to the inside, while the muscular fibres covering it, either absolutely or relatively insufficient, more or less lengthened, perhaps also displaced or changed in their structure. Be this as it may, still, in treating lachrymal blennorrhœa, great distension of the sac must always be considered a matter of importance. It may be attempted to control the distension by frequently evacuating the contents, or by a strong methodical compression; it may, perhaps, also be attempted to produce a diminution of the cavity and an alteration in the amount of secretion by cutting out a portion of the anterior wall, or cauterization of the mucous membrane after the sac has been slit. At all events, it must not be for-

gotten that in spite of the restoration of the necessary permeability of the lachrymal passages, the tears may still continue to flow over the cheek, particularly in cases where such a distension is of long duration, and where it may be concluded a large cavity exists, if not from the curvature of the anterior wall, from the amount of fluid repeatedly evacuated by pressure with the finger.

I pass now to those means which have heretofore been employed in order to remove the obstructions which prevent the conduction of the tears through the nasal duct.

The perforation of a new way is, perhaps, obsolete. The method of Dupuytren, to procure an outlet for the tears by means of a metallic tube, has been generally and correctly abandoned. Recently two old methods have again been brought into notice: the perforation of the strictured part in the line of the natural duct, and the perforation of the lachrymal bone by means of a trocar or trephine. I have not been able to determine upon either the former or latter of these methods, because the prospect of keeping such a channel open is even *à priori* very small. I have preferred in such cases rather the immediate destruction of the

sac, as I attach less importance to the slight amount of lachrymation which sometimes remains afterward, together with the operative invasion, than to these methods of forming and keeping open a new way, which are accompanied moreover with painful, troublesome, tedious, and finally very uncertain procedures.

The *dilatation of the natural passage* I have practised for nearly two years, with slight modifications, exactly according to Bowman's method, only the idea from which I proceeded, or, rather, to which I was led in the course of my observations, is other than that which appears to have been in the mind of the great reformer of the treatment of lachrymal affections. I hold the opinion, *that for the restoration of the normal function, so great a distension as is produced by Bowman's probes Nos. 5 and 6 is neither necessary nor without danger.*

It is not necessary, for in the course of the last three years I have seldom employed No. 5, and never No. 6, and yet I have obtained many lasting results. Indeed, since that time I have had in scarcely a case to complain of adhesions of the canaliculi or nasal duct as a consequence of using the probe. It is the large probes, according to my mind, which may



cause wounds and after-adhesions, even though the instrument be correctly introduced.

We will next consider the procedure in probing through the inferior canaliculi. A portion about three lines in length cannot be slit, or, at least, converted into a channel which will remain open. The diameter of this portion is smaller than the diameter of No. 5. If we admit even, that the size of the probe may be gradually increased from smaller to larger instruments, indeed until No. 6 can be introduced without danger of stripping off the epithelium of the mucous membrane, still we are not always sure but that we may burst or lacerate the canaliculus. The line of the inferior canal forms an acute angle with the line of the lachrymal passages, so that in elevating the instrument, the end of the intact portion of the canal must be all the more displaced and dragged upon the longer it is and the closer it surrounds the instrument. The outer as well as the inner parts only permit of a slight displacement, and especially can lacerations of the inner ends not always be avoided, notwithstanding the probe be slowly elevated. When No. 6 has been easily introduced, and a long pause takes place in the treatment, it is

suddenly found that not a single instrument, or only the smallest, can be made to enter the lachrymal sac. Besides this, I will mention that sometimes where even No. 1 did not enter, I have succeeded in effecting a passage with a conical probe, by keeping exactly in the proper direction, and could then gradually employ larger instruments. Whether complete adhesion has taken place at a later period, I do not know, because unfortunately so soon as the patients were not troubled by the tears flowing over the cheek, they remained away. Where the attempt just mentioned did not succeed, the superior canaliculus was slit, and the probe introduced through it.

I do not know whether mischief may be caused where larger probes than No. 4 can be easily introduced into the nasal portion of the duct, in which, as is known in the greater number of cases, the opening is small, but fear that such may be the case. When the nose of the patient bleeds after the removal of the instrument, I consider it as an inducement to cicatricial contractions or adhesions, and always permit several days to elapse before resuming the treatment. Should the nose bleed after the first introduction, it is a fault in either

the entrance or withdrawal of the probe. I commence these latter cases, having the head fixed, just as carefully and nearly as slowly as the former. If bleeding occurs at a later period when large probes are used, it is very probable that the epithelium has been stripped off, or a rupture been produced, perhaps only because the instrument was too large. When large probes are used, if the instrument produces the impression, on being removed, as if it were held fast by the duct, I omit the treatment for several days, and take a smaller sound the next time. Sometimes, instead of Nos. 3 and 4, I employ slightly curved probes of vulcanized rubber, which pass in many cases where silver instruments of equal size could not be introduced without danger.

Probing through the superior canaliculus I have only instituted where the inferior was impassable from adhesions. It appears to me that slitting the canal, as well as the correct introduction of the probe, is less easily accomplished, especially where the supra-orbital process is very prominent. It is not always easy to stretch the canaliculus in the proper direction in order to cut it correctly, still less to keep it tense and introduce the instrument below and

inwards on the anterior inferior wall of the canal. The elevation is not only easier, but attended with much less danger, as the intact portion of the canal forms a very obtuse angle with the line of the lachrymal passages. By using probes which are relatively too large, the danger is imminent even here of stripping off the epithelium or bursting the canal; and should the instrument be elevated before it is certain the point has passed the internal opening, a perforation of the wall may be injurious to the inferior canaliculus. This method is distinguished from Anel's by the outer portion of the canal being slit, which permits the introduction of larger probes with far less danger of dragging on the canaliculus, or catching the point in the internal wall of the sac. Large probes are more easily directed, admit of a better touch, and do not bend so easily as the thin instruments which Anel must employ.

I have never made use of Weber's system\* because, at the time of its publication, I was engaged in examining the method of Bowman. During the course of this examination it became gradually evident to me that it depended

\* Graefe, *Archiv. f. Ophthal.* VIII-I.

not so much on the smoothing out of the walls as on the restoration and maintenance of the duct, which is large enough, in order to present no insurmountable obstacle to the passage of the tears forced down by the action of the orbicularis muscle. Can it be supposed that Anel has never produced a cure with his thin probes? A reliable old practitioner, Dr. Schmalz, of Perna, informed me he had obtained the best results by simply introducing a seton after the method of Ad. Schmidt.

Too much stress cannot be laid on the analogy which exists between the nasal duct and the urethra. In the latter, we are so often able to correct and control our conjectures by autopsies regarding the position and character of the stricture, that we acquire a certain amount of accurate information for the continuance and indications of treatment. In the former, however, the results of dissection are generally, or nearly entirely, wanting, and the relations of such results to previous observations on the course of the affections, employment of caustics and probes, will long remain a *prime desideratum*. The urethra is surrounded by soft, somewhat elastic tissue; the nasal duct, on the contrary, inclosed by bone.

What happens to the circulation of the mucous membrane when it is compressed between the probe or bougie and bone? What condition follows generally after this contusion? May it not occur by the introduction or removal of probes made of *laminaria digitata*, that the union between the mucous membrane and bone is rather loosened than the cohesion broken which exists between the probe and mucous membrane? The affections of the urethra are mostly in consequence of local irritations, but the lachrymal passages are scarcely accessible to anything but the tears. It is a well-known fact, even in cases of blennorrhœa of the conjunctiva, acute or chronic, occurring either in new-born children or adults, that an extension of the inflammation to the lachrymal sac is comparatively seldom observed. Almost all lachrymal affections are referable to a chronic catarrhal inflammation of the mucous covering of the sac, and this is connected, certainly in the majority of cases, with extensive disease of the mucous membrane of the nose, of the throat, with scrofula, unsuitable mode of living, and unfavorable relations of life. Have we then to seek the cause always with chronic relapsing ca-

tarrhal inflammation, or at first in insufficient local treatment? May not inflammation and contractions take place anew in a totally distended sac? I consider the use of the probe as one, but not the only remedy for chronic catarrhal affections of the mucous membrane of the lachrymal passages. I have seldom employed injections of medicated fluids, particularly moderately strong solutions of sulphate of zinc or nitrate of silver, but will use them at some future time with the syringe-probe recommended by Wecker,\* yet I do not expect to obtain much from them.

That I cannot persuade myself to incise the point of stricture, with subsequent dilatation, the reader has probably already presumed from previous remarks. It is almost impossible to introduce the necessary instruments, and control them, without other parts being wounded at the same time than those which are intended. Stilling's system,† which Warlamont‡ praised, demands, according to the results, at least further trial.

In cases of lachrymal fistule I never intro-

\* *Maladies des Yeux*, Paris, 1868, t. i, p. 890.

† Cassel, 1868.

‡ *Ann. d'Ocul.* t. lx.

duce the probe through the opening, but through the cut canaliculus. It is known that when probes, setons, etc., have been introduced for a long time through fistules, they are more difficult to close. The sooner, therefore, a fistule can be closed, the better and more pleasant is it for the patient.

With beginning inflammation of the lachrymal sac, I can recommend, supported by new experience, a forcible pressure bandage, repeated most energetically, alone or after the canaliculus has been slit, in case this is still possible. It is true this method is not always successful, particularly where the inflammation has already far advanced, but in the former cases no harm is done, and in the latter the patients are spared much pain and the annoyance of having the anterior wall of the sac opened, either spontaneously or artificially. During the last year I have demonstrated three excellent results on clinical patients, and have only had one case without success.

In closing these remarks, I beg permission to bring forward the advantages which Bowman's system presents over all others, if done in the manner indicated. It leads, with proper patience and perseverance, to the results wished



for, so soon as no other obstacle prevents the conduction of the tears, than tumefaction of the mucous membrane, with or without stricture. The patient will scarcely experience any injury by the probe being passed through adhesions in the canaliculus or nasal duct, and the practitioner may also redeem his word when he promises the patients they will experience but little pain. All unexpected movements of the head must be guarded against, and the patient allowed to sit with the head inclined backward and supported from behind. The patients submit to this procedure almost without exception, so soon as they are in condition to appear daily before the physician for several weeks. This method cannot be too highly valued, when it is remembered that a rational and certain treatment can be introduced where cicatrization has not far advanced. Indeed, if the process has already advanced to the formation of a fistule, its closure may be expected in the simplest manner and short space of time, and consequently obviate the disfiguration of the face. The greatest advantage consists, however, in keeping open a passage for the introduction of the probe for those cases of relapse which may

occur in every method, not excepting the obliteration of the sac, which is not always equally successful, and in case the patient resides at a distance, in making him or some one else familiar with the introduction of the instrument, so that the treatment may be continued for any desired length of time.

## EXPLANATION OF THE PLATES.

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FIG. 1 is a horizontal section of the right orbit, at the height of the tarsal ligament. *a*, the nasal bone; *b m*, the rectus internus; *c*, the eyeball. As a bristle has been introduced through the inferior canaliculus, it appears more dilated than normal; the angle between the eye and nose shallower, and the portion behind the conjunctival sac somewhat enlarged. The bristle is seen in front of the opening of the canaliculus into the lachrymal sac, because the canal has been cut by the section in its course above and inwards, and the internal end removed. The inner end of the bristle appears pushed slightly posterior. The semi-lunar folds are seen as thread-like prominences at the posterior part of the conjunctival sac.

FIG. 2 is a view of the lachrymal passages from behind inwards. The openings of the canaliculi are seen just below the roof of the sac as dark points, and the sinus below is distinguished by the dark shading. The maxillary portion of the duct shows two depressions of the surface, dark shading and a marked dilatation above the ridge for the turbinated bone. The

nasal portion has been left undisturbed, and is seen as a sort of pocket, with an inferior opening of about three quarters of a millimeter in diameter.

FIG. 4 presents a view of the entrance to the nasal portion as seen from above, the diameter of which cannot be more than one millimeter.

FIGS. 3 and 5 present the same view of another preparation, which is peculiar for the unusual size of the lachrymal passages. The grooves in the sides of the maxillary portion are here deeper and more numerous. The nasal portion appears as a pear-shaped opening. Fig. 5 shows the opening of the maxillary portion in the inferior nasal passage as viewed from below.

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